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Use of ancient Latin-American crops in bread. Effect on mineral availability and glycemic index

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Products with whole grains generally have a lower glycemic index (GI) than their fibre-free counterparts, maintaining better control of blood sugar levels. However, whole grains contain significant amounts of phytates, a well-known inhibitor of mineral, proteins and trace elements bioavailability.

This study evaluates the effect of replacing wheat flour by amaranth, quinoa or chia, three ancient Latin-American crops, on nutritional and functional bread features. GI (AUC, %) and mineral bioavailability were studied using *in vitro* and *in vivo* methodologies, and wheat- and whole-wheat bread as controls.

The replacement of wheat flour by Andean grains significantly increased the content of proteins, lipids, dietary fibre and minerals in the final product compared to control sample. Amaranth and quinoa flours made wheat flour replacement possible, increasing nutritional value of bread with slight depreciation of it, whereas chia showed higher technological and sensory quality than wheat bread. GI was lower in breads with chia (81±2%), amaranth (66±3%) and whole wheat bread (71±4%), whereas the formulation with quinoa did not modify this parameter. Breads formulated with whole grains had higher levels of minerals relative to controls. Their bioavailability depends on the formulation and breadmaking process, basically because of the presence of phytates, as predicted by inhibitory threshold values for mineral absorption predicted by phytate/mineral molar ratios. Animals fed with whole wheat- (14.7±1.3g/dL), chia- (17.4±2.8g/dL) and amaranth-bread (16.4±2.2g/dL) showed higher haemoglobin concentration than those fed with control bread (12.3±0.2g/dL). Only animals fed with samples with chia had values of mean corpuscular haemoglobin, 31±5pg, higher than controls.

Biography

C Monika Haros, graduated as a Bachelor of Chemistry from the School of Exact and Natural Sciences, University of Buenos Aires (UBA), Argentina in 1990. She obtained an MSc in Bromatology and Food Technology (1992); and an MSc in Biology Analysis (1997) from UBA. She is Ph.D in Chemistry (UBA-1999). From 1991-2003, she worked as university professor in the Organic Chemistry Department, Food Science and Technology Area of UBA. From 1991-1999 she was Research Assistant in the Cereals and Oilseeds Group, Department of Industrial Chemistry, UBA. Later, from 2000-2002 she worked in Spain as a visiting professor in the Cereal Group of the Institute of Agrochemistry and Food Technology (IATA) in Valencia. In 2003, she was a postdoc fellow at the Department of Food Microbiology, Institute of Animal Reproduction and Food Research (CENEXFOOD-EU), Polish Academy of Science, Olsztyn, Poland. From 2003-2004 she received an award for working in the Department of Chemical and Biological Engineering, Life Science Division, University of Chalmers, Gothenburg, Sweden. In 2005 she became an Associate Researcher of the Spanish Council for Scientific Research (CSIC) in the framework of a Ramon y Cajal Programme. Since 2008 she is a Senior Scientist at CSIC and continues her investigation in the Cereal Group, Department of Food Science of IATA. In recent years she has focused on: use of phytases from Bifidobacterium for increasing mineral availability of vegetable foods, utility of Andean crops for improving nutritional value and health benefits of bakery products, develop new cereal/pseudocereal wet milling process for obtaining starches and protein isolations with new nutritional and functional features.

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